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PAPER ON THE GERMAN SIGINT SERVICE

by

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The attached document is a complete translation of a paper on the German Signals Intelligence Service with special reference to that of the G.A.F. by Oberstltn. FRIEDRICH, IC General Nachrichten Fuehrer 3 Abteilung, GAF Sigint organisation.

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The German Signals Intelligence Service

Its successes and limitations

(Situation as in spring of 1945).

I.

1. Any appreciation of German Signals Intelligence and its successes and limitations at the end of this war must begin with a statement of how and in what conditions it can be employed.

Only a survey of the many-sided tasks and a comparison with the work of the enemy will give a basis for evaluation of one of the most important means of intelligence.

Hence before dealing with the possibility of German Signals Intelligence breaking into the enemy radio service we shall preface the following observations:

The successful operation of signals intelligence depends on:

a) the technical efficiency of the enemy,
b) the manner in which the enemy is using H.F. methods,
c) the technical efficiency and capabilities of one's own signals intelligence.

2. In the last war, as far as the air forces were concerned, two principal spheres of employment of H.F. technique were distinguishable:

a) H.F. services purely to transmit reports, i.e. radio traffic of all kinds,
b) H.F. services for radar purposes, i.e. employment for navigation, guiding a/c, locating a/c, etc.

It was the task of German Sigint to intercept traffic in these two great spheres for each individual enemy country, to investigate them and to use the results profitably for its own conduct of operations. In accordance with these tasks German Sigint was divided into:

a) a listening service operating against the enemy radio communication services,
b) a radar monitoring service operating against enemy radar services of all kinds.

3. What in detail are the tasks of the listening service, how does it work and what are the principles of its evaluation? An exhaustive treatment of these questions is beyond the scope of the present treatise. A survey is however necessary to make the later remarks clear.

A radio message sent by the enemy, either on ground-to-ground, air-to-ground, or air-air traffic, offers various possibilities of evaluation. The principal ones are:

a. Reading (deciphering) the message and evaluating its contents (content evaluation).
b. Drawing conclusions from the radio traffic on which the message was sent. This includes D/Fing of the transmitting station, recognition of the radio traffic concerned (control and subsidiary stations), establishing callsigns and the way in which they are allocated, use of frequencies and allocation to individual traffics. In short, traffic analysis.

From this it follows that, besides the pre-requisite of a well-equipped, well-trained and adaptable Sigint service, above all the enemy's manner of using his radio services is a primary factor for successful operation of the Sigint service.

4. Whereas the listening service is based mainly on content evaluation and upon traffic analysis, the radar observation service is based almost exclusively on traffic analysis. Here it is particularly important to pick up the radiation of enemy sets, and noting their radiation characteristics, to D/F them and to assign them to technical and physical processes. In this case evaluation must be done at the observation set while radiation is taking place. Subsequent evaluation can only be a summary of the facts established at the observation set. The summaries may be of vital importance for one's own conduct of operations. In the radar observation service the heaviest part of the task falls on the man at the receiver. The degree of difficulty of his work again depends on the more or less skilful use of radar services by the enemy.

II.

In this section the results of the German listening service against the individual enemy air forces are described.

1. Russia

The air units of the Red Army were forced, owing to inadequate line communications, to exercise command from the Air Army downwards almost exclusively by radio.

a. Ground-to-ground traffics:
85% of the Morse radio traffic of radio networks of Air Armies, Air Corps, Air Divisions and the whole ground organisation including supply was, in spite of being enciphered, read by us. The remaining 15% comprised radio messages not suitable for decipherment or radio messages whose ciphers had not yet been broken.

The ground-to-ground R/T traffics, e.g. in the fighter control service, were simple word encodements, hence known in full according to the local reception conditions prevailing at any one time.

b. The ground-air Morse traffics of the bomber formations (ADD) were only partially decipherable, i.e. when sufficient material of the individual code tables [signaltafeln] was available. However the results from traffic analysis of these traffics, in conjunction with the ground traffics pertaining to them, were sufficient to enable us to recognise current operations in good time and to follow their course.

The ground-air R/T traffics, for example those of fighter formations, were simple word encodements. The rules for construction of call-signs [Rufnamen] were sufficiently known.

For air-air traffics the same can be said.

c. The German listening service operating against the Russian airforce accordingly had at its disposal:
1) The full contents of practically all radio traffics,
2) A clear picture of the set-up of networks and the working of these networks.

This picture enabled the listening service to ascertain:
1) the deployment of the air force and its alterations currently,
2) the control systems of the air force, e.g. the fighter control service,
3) the state of and changes in the ground organisation including aids to navigation,
4) supply conditions,
5) details on the organisation of the air force as a whole,
6) by coördination of these detailed results, enemy intentions in conduct of operations (focal points),
7) route-tracking of formations in the air,
8) insight into economic system etc.

d. Reasons for this break-in were:
1. Our knowledge of Russian codes and ciphers from the beginning. Quite skilful Russian improvements to these codes and ciphers which were always being introduced were almost always solved in time, sometimes by dint of great efforts, by specialists who had been working for years on this type of encipherment.
2. The set-up of the Russian radio networks was a reflection of the organisation of the Red Army Air Force and closely connected with it. As the radio service was used without restriction (inadequate line communications), traffic analysis reached a considerable height of efficiency. Insight was further considerably facilitated by imperfect changes of working documents and bad radio discipline.

2. America

Here we shall consider the period from the first appearance of the 8th and 9th Air Forces in England to the end of the war.

a. Ground-ground Morse traffics:
Traffics of the 8th Air Force with its bomber and fighter command were clarified after a time. The setting up later of the 9th Air Force with the individual tactical Air Corps made itself clearly apparent in particular from the various practice exercises which were held in Midland and Southern England areas. These radio traffics lasted until the end of the war. Further details may be seen from the reports of Chi-Stelle Ob.d.L. already in English hands (Lt.Col. Green)*.

For evaluation in this case we obtained only results of traffic analysis; decipherment of these radio traffics was not possible.

Ground-to-ground R/T traffics were not monitored, as far as I can remember.

b. Ground-to-air Morse and R/T traffics were intercepted. Several systems used were breakable. Call-signs used in R/T traffic were soon identified. Both content evaluation and traffic analysis obtained useful data for their work from the radio messages intercepted. The same applies in the case of air-air traffic as in the case of ground-air traffic.

c. The radio beacons, from the manner in which they were used, gave considerable evidence for recognition of impending raids. Other navigational aids will be treated in Section III.

[*Name used by British interrogator. It is not true that "Lt.Col. GREEN" holds the "reports of Chi.Stelle Obd.L." Reference is probably to the War Diary of Gen Nafue 3 Abt. See TICOM/D-4.]

d. The German listening service hence had at its disposal:
   1. No contents from ground-ground radio traffics, but considerable data from traffic analysis;
   2. From ground-to-air radio traffics of all kinds the content in very many cases, and in every case the results of traffic analysis.

   This insight enabled the listening service to ascertain:
   1. The deployment of large sections of the USA air force and changes in them;
   2. Insight into order of battle;
   3. Considerable indications of impending attacks and route-tracking of formations in the air.

e. Reasons why it was possible to break into these radio traffics were:
   1. The reliance on good encipherment and neglect of supervision of American radio traffic. Almost fixed frequencies, without radical changes of callsigns etc. enabled the German traffic analysts to arrive at far-reaching conclusions;
   2. An almost continuous radio traffic in the air, beginning already when a/c were assembling, made possible a complete route-tracking of formations;
   3. Radio traffic beginning regularly and uniformly, always sent by a routine procedure, contributed to the completion of the picture.

3. England.

Up to about the beginning of 1942 the radio traffic of the RAF in general resembled the American in the way in which it was carried out. The English 4-figure code could be read up to the end of 1941. After this date the English radio traffic showed a marked and constant improvement in cipher methods and wireless discipline. Apparently the working of the German listening service had become widely known. At the last the RAF was the most difficult opponent of the German listening service.

a. Ground-ground Morse traffics:

   These radio traffics allowed the German traffic analysts to get a pretty good picture up to the end of the war, even though decipherment was no longer possible. Deployment and movements were still clearly recognisable. (Forward battle HQs, etc.) Once the fundamental data had been obtained, it was only a question of maintaining interception of stations. Callsigns and frequencies in conjunction with occasional enquiries in clear made this task easier. Collected results obtained by Chi.Stelle Ob.d.L. are in English hands.

   I cannot remember anything about ground-ground R/T traffics.

b. Ground-air Morse and R/T traffics:

   These were intercepted without difficulty. Only part of the Morse traffics could be deciphered. The main difficulty was to collect together with sufficient speed as large a number as possible of radio messages of the same type, for example those of recce a/c. Tactically trained traffic analysts succeeded in breaking into to a certain extent the tactical methods of formations on various occasions. These ground-to-air traffics also gave an insight into the ground organisation, the a/c safety and control procedure.

c. The German listening service thus had at its disposal:
   1. No contents from ground-to-ground radio traffics, but good results from traffic analysis;
   2. From ground-to-air traffics contents to a large extent, and results of traffic analysis.

This insight enabled it to establish:
1. Part of the deployment and the order of battle of the RAF including its ground organisation;
2. Indications of impending air raids, recognition of air tactics and to a certain extent route-tracking of these units.

d. Reasons making this insight possible were;
1. Insufficient change of callsigns and frequencies,
2. No changes of location of radio stations belonging to definite HQs,
3. Still inadequate traffic discipline among personnel, particularly in ground-to-air traffics.

III.

The second section deals with the use of H.F. apparatus for radar purposes. This use only plays a part in the West.

1. Russia:
Only ground radar services were picked up, no airborne radar services. The Red Army Air Force may be left aside for the purposes of this treatise. The Air Force will however make every effort in the future to employ radar apparatus.

2. England:
a. Ground radar services:
a/c reporting sets, operating principally on the south coast of England, were monitored and identified as to their functions. The experience gained here formed the basis for the working of the radar monitoring service in identifying more difficult sets. After this the ground radar services, the most important of them at any rate, were picked up very soon after they began to operate and their purpose was clarified. The radar monitoring service played a large part in the final clarification of the procedures connected with these sets.

b. Airborne radar apparatus:
On the basis of experience gained in monitoring ground radar installations we also succeeded, after initial difficulties, in picking up the airborne radar installations used and in allocating them to their corresponding ground installations. A distinction was soon made between purely airborne radar sets and aids to navigation. In this way the Boomerang system, the Hyperbola system, the Rotterdam set, the warning sets, recognition sets etc. were clarified with regard to frequencies and mode of working. Summarised descriptions are contained in the various reports of Funkleitstand Ob. d. L.

c. These results from pure traffic analysis of English radar services enabled the German radar monitoring service to ascertain or to establish:
1. Mode of operation of ground radar sets. In coöperation with the listening service it was possible to ascertain the areas in which interception by the enemy [transl. note: could also mean "of the enemy"] was not possible.
2. Clarification of navigational aids to the extent that the English control systems became known (advance warning).
3. Data for our own jamming service and technical hints for our own development of similar sets.

4. Carrying out of route-tracking of formations in the air; in most cases from take-off until landing.

d. Reasons making this possible were:

1. The technical impossibility of preventing outsiders receiving radar radiations.
2. Insufficient control of the times during which these sets were used. In the most recent period efforts by the English command to rectify this were noticeable. However, there were continual transfressions of these apparently existing regulations by flying personnel, to the advantage of the German monitoring service and to the disadvantage of the air crews themselves.

3. America:

For radar services in the American air force the remarks in the preceding paragraph 2 hold good concerning their equipment and systems. We must point out however that far greater carelessness in their employment was found.

IV.

The only thing we shall say here about the German radio jamming service is that it would not have been possible for it to operate without the results of the listening service and of the radar monitoring service.

V.

1. A comparison of the German radio recce against Russia, England and America shows that:

a. The break-in into the radio organisation of the Red Army air force was fully successful both from the point of view of decipherment and of traffic analysis;
b. The breaking of ciphers in the R.A.F. radio services was from 1942 on only successful in ground-air traffics under certain conditions. However German traffic analysis continued to obtain adequate data from the traffic sent.
c. The remarks in the preceding paragraph b hold good for the American air force. The traffic sent however afforded a far greater amount of data for traffic analysis.

2. Since in use of high frequency services radiations are subject to technical laws, and their reception by outsiders can hardly be prevented, measures must be taken in our own radio service to reduce this danger to a minimum.

Control of our own radio service must include:

a. Continual checks on codes and ciphers by the listening service.
b. New codes and ciphers must be based on the one-time principle (non-depth).
c. Times of using radio services are to be reconciled with tactical requirements by those in charge of operations, and not by specialists.
d. Radio traffic must not become stereotyped. Changes in working documents must be continually introduced. Here considerable resistance from the specialists and from the air crews will have to be overcome.
e. Personnel employed must continually be given instruction, the results of the listening service being used.
f. Setting-up of a service to supervise one's own radio service, especially in signals practice exercises.

3. The successes of a signals intelligence service, however, do not depend on the more or less skilful practice of the enemy, but just as much on the knowledge and capability of the sigint personnel. Besides careful selection of personnel and provision of efficient equipment, in particular organisation and adequate communications within the sigint organisation are of paramount importance. Successful work is only possible under a centralised command. The right of tactical formations in an intermediate position (Luftflotten etc.) to give orders must be excluded. They must confine themselves to necessary cooperation in tactical matters with the radio recce units operating in their areas. Evaluation must be centrally controlled; nevertheless initiative of individual evaluating stations must not suffer thereby.

VI.

In conclusion it may be said of the German Signals Intelligence Service: as long as H.F. services of all kinds continue to be used in military and commercial life, a fruitful radio recce will always be possible owing to technical shortcomings and the human shortcomings in handling them. Hence in a military sphere it is the duty of the tactical commanders to concern themselves intensively and in good time with their own H.F. services and those of foreign countries. The most important thing is that this important weapon should not be left entirely in the hands of specialists. If the tactical commanders do not grasp this fact, then their omission may lead to considerable tactical and strategic reverses.

In peace time signals intelligence is a mine of information on other countries, for their supervision of the running of radio services is less strict, and hence they offer a wealth of openings.

Possibility of signals intelligence exists in particular against countries which are forced to use radio for lack of line communications, and which cannot dispense with the use of short waves, owing to the large distances to be covered.

Thus with only a few personnel in various areas, and at slight expense, it is possible, while easily maintaining security, to have a signals intelligence organisation affording a modern intelligence service an up-to-date picture of the whole life of a country.

[Trans. A.C.J.]